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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/765,543	01/19/2001	Hoe-Seong Ha	4591-160	1427

7590 06/19/2002

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EXAMINER

ESTRADA, MICHELLE

ART UNIT PAPER NUMBER

2823

DATE MAILED: 06/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/765,543

Applicant(s)

HA ET AL.

Examiner

Michelle Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 11-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-10, drawn to a semiconductor device, classified in class 257, subclass 506.
- II. Claims 11-17, drawn to a process of making a semiconductor device, classified in class 438, subclass 295.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case that the process as claimed can be used to make other and materially different product such as one that does not comprise an impurity diffusion region formed in an active region surrounded by the device isolation region.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Hson Wee on June 11, 2002 a provisional election was made to prosecute the invention of Group I, claims 1-10. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11-17 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4 and 6-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Noda (6,373,119) and Arafa et al. (6,294,823).

Noda discloses a semiconductor substrate (1) having a top surface; a device isolation region (20) formed in a predetermined region of the semiconductor substrate, the device isolation region having a protrusion that is higher in level than the top surface of the semiconductor substrate; an interlayer insulating layer (9) formed over the resultant structure; and a contact hole (10) opening the interlayer insulating layer, the

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contact hole exposing at least a portion of the impurity diffusion region (8a) (Col. 7, lines 24-29); further comprising a thermal oxide layer (3) interposed between the semiconductor substrate and the trench isolation region (Col. 5, line 56); further comprising an interconnection line filling the contact hole (12); a contact plug (11) filling the contact hole and a interconnection line (12) overlying the contact plug (Col. 6, lines 9-10);

Noda does not disclose an etch stop spacer formed overlying a sidewall of the protrusion; and an etch stop layer formed over the resultant structure.

Arafa et al. discloses a isolation region (209) in a predetermined region of the substrate; a silicon nitride etch stop spacer (211) and a silicon nitride etch stop layer (220) formed in the resulting structure; an interlayer insulating layer; a contact hole opening the interlayer insulating layer and the etch stop layer; wherein the etch stop layer is partially etch; wherein the isolation region comprises a trench isolation region (Col. 3, line 13); a contact plug (117); wherein the contact hole exposes a portion of the etch stop spacer adjacent to the impurity diffusion region.

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Noda and Arafa et al. to enable formation of the contact and further the etch stop layer provides additional protection to the gate structure.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Noda (6,373,119) and Arafa et al. (6,294,823) as applied to claims 1-4 and 6-10 above, and further in view of Akatsu et al. (6,319,794).

The combination of Noda and Arafa et al. does not disclose a silicon nitride liner interposed between the trench isolation region and the thermal oxide layer.

Akatsu et al. discloses a trench isolation region (49); a thermal oxide film (11) interposed between the substrate and the trench isolation region; a silicon nitride film (40) interposed between the thermal oxide film and the trench isolation region (Col. 8, lines 55-60).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Noda, Arafa et al. and Akatsu et al. to enable formation of the trench isolation structure and further the silicon nitride liner improve the oxidation of the silicon in the anneal step (Col. 1, lines 56-59).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 703-308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431 and 3432) for regular communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

M Estrada

MEstrada

June 16, 2002

Wael Tabbara

SUPERVISORY PRIMARY EXAMINER
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